

ABSTRACT OF THE DISCLOSURE

A semiconductor device having a semiconductor layer, includes: a first impurity atom having a covalent bond radius larger than a minimum radius of a covalent bond of a semiconductor constituent atom of a semiconductor layer; and a second impurity atom having a covalent bond radius smaller than a maximum radius of the covalent bond of the semiconductor constituent atom; wherein the first and second impurity atoms are arranged in a nearest neighbor lattice site location and at least one of the first and second impurity atoms is electrically active.